



## Freshwater cyanobacterial blooms and primary liver cancer epidemiological studies in Serbia

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### Abstract:

A large part of Central Serbia experiences continual shortage of sufficient ground water resources. For that reason, more than 20 reservoirs serve as drinking water suppliers. Significant and persistent cyanobacterial "blooms" have been recognized in nine of them. Samples for cyanotoxin analyses were taken during and after "blooms" in Celije Reservoir and from Krusevac town-supplied tap water from that reservoir two days later. Concentration of microcystin-LR was 650 microg L<sup>-1</sup> in the reservoir, while the tap water contained 2.5 microg L<sup>-1</sup>. In the two investigated periods, the high primary liver cancer (PLC) mortality of 11.6 from 1980-1990 and extremely high PLC incidence of 34.7 from 2000-2002 were observed in the regions affected by heavy cyanobacterial "blooms." In contrast, PLC mortality and incidence rates were substantially lower in the regions not affected by cyanobacterial blooms: in 1980-1990 the rate of PLC mortality amounted to 2.7 in Kosovo, 7.6 in Vojvodina, and 8.3 in the non-affected regions of Central Serbia; while in 2000-2002 PLC incidence amounted to 4.1 in Kosovo, 5.2 in Vojvodina, and 13.6 in the non- or less-affected regions of Central Serbia. Keeping in mind that the most affected PLC regions in Central Serbia (Toplicki, Niski, and Sumadijski regions) have the water supply systems based on six reservoirs found regularly in bloom during summer months and that some of the regions are also connected with two boundary "blooming" reservoirs, representing a total of eight of nine blooming reservoirs, it is easy to presume that the PLC incidence could be related to drinking water quality. The uneven geographic distribution of liver cancer in Serbia is conspicuous and hot spots could be related to drinking water supply. It is very clear that the high-risk regions for PLC occurrence correspond with drinking water reservoirs continually found with cyanobacterial blooms, and the low risk regions correspond with water supplies not affected by cyanobacteria.

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### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality

**Food/Water Quality:** Biotoxin/Algal Bloom

#### Geographic Feature:

# Climate Change and Human Health Literature Portal

resource focuses on specific type of geography

Freshwater

## **Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** Serbia

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Cancer

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Time Scale Unspecified

## **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content